# Hazard Vulnerability Analysis

## SUMMARY

The Joint Commission on Accreditation of Healthcare Organizations has significantly revised the standard for emergency management (EC.1.4) in the 2001 edition of the Comprehensive Accreditation Manual for Hospitals. Although hospitals have always had to plan to respond to a "variety of disasters," the 2001 standard continues to state that the hospital response plans must be "based on a hazard vulnerability analysis performed by the hospital." The hazards that have occurred or could occur must be balanced against the population that is at risk to determine the vulnerability to the given hazard. Formalizing the requirement for a hazard vulnerability analysis does serve to formalize the process within hospitals, and organizations should now be able to produce documentation to evidence the analysis. This document will serve to discuss the factors entering into the analysis and provide a tool that may be used by organizations to document it.

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# Healthcare Facilities Management Series

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# **CONTENTS**

Introduction5
All Hazards
Probability6
Risk
Preparedness
Hazard Vulnerability Analysis Tool
References9
Hazard Vulnerability Analysis

#### Introduction

The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) has significantly revised the standard for emergency management (EC.1.4) in the 2001 edition of the Comprehensive Accreditation Manual for Hospitals. This was done to bring hospital emergency planning into the same arena as emergency management in the community as a whole. Wording has been revised so that all emergency response agencies can "speak the same language" and work within compatible command structures. The hospital must now function as an integrated entity within the scope of the broader community.

Although hospitals have always had to plan to respond to a "variety of disasters," the 2001 standard continues to state that the hospital response plans must be "based on a hazard vulnerability analysis performed by the hospital." The JCAHO defines hazard vulnerability analysis as "the identification of hazards and the direct and indirect effect these hazards may have on the hospital." The hazards that have occurred or could occur must be balanced against the population that is at risk to determine the vulnerability to the given hazard.

The terminology "hazard vulnerability analysis" may be new to many hospitals, but the concept itself is not new. Those involved in emergency management have performed this analysis in their heads, as much of the basic process is highly intuitive. Minnesota hospitals do not have to plan for a hurricane, as the folks in Florida know they must. Minnesota facilities will need to plan for a snowstorm; those in Florida will not.

Formalizing the requirement for a hazard vulnerability analysis does serve to formalize the process within hospitals, and organizations should now be able to produce documentation to evidence the analysis. This document will serve to discuss the factors entering into the analysis and provide a tool that may be used by organizations to document it.

#### All Hazards

Hazards may be thought of as extreme events. Hazard vulnerability analysis is often based on an "all hazards approach." This means that one begins with a list of all possible disasters, regardless of their likelihood, geographic impact, or potential outcome. The list may be the result of a committee brainstorming session, research, or other methodology, and should be as comprehensive as possible.

It may be helpful to divide the potential hazards into categories to focus the thought process.

Typical categories may include natural hazards, technological hazards, and human events. These are certainly not requirements, and should not be considered to be constraining. There is overlap between the categories as well, for example, a transportation accident may be considered to be a technological hazard rather than a human event.

Once the complete hazards listing is developed, look at it critically for items that might be appropriately grouped together as one hazard category.

Organize the list as appropriate.

Ultimately, a prioritization process will be undertaken to determine the course of emergency planning. The realistic factors of time and money certainly play a role in decisions of preparedness, and facilities must choose to apply their limited resources where they will have the most impact. To work toward this end, each identified hazard will be evaluated for its probability of occurrence, risk to the organization, and the organization's current level of preparedness.

## **Probability**

Due to the nature of disasters, they are not predictable with any degree of accuracy. Still, familiarity with the geographic area, common sense, and a little research will identify those for which the facility must be most prepared. It is important to consider both normally expected occurrences as well as unlikely scenarios.

Types of regularly occurring natural disasters are typically well known within a community, be they hurricanes, earthquakes, tornadoes, floods, or wildfires. The community will often be able to provide data that include hundred-year flood plains, hurricane frequencies for the locale, etc. The weather bureau may also be able to provide input. In fact, community emergency planning agencies may have already done a community-based hazard vulnerability analysis. This will not be a complete solution for the hospital, but it will provide a start.

Hospitals have become increasingly dependent on technology to provide their normal services. As a result, a failure of a given technological system can easily put a facility into an internal state of disaster. Beyond the walls of a hospital itself, technology in the community can fail or lead to an incident creating victims in need of medical care or otherwise affecting the healthcare facility. External transportation failures can lead to unavailability of supplies to the hospital, which can also be

disastrous. To determine the probability of these events, one must examine the internal technology in the facility and the availability of backup systems to compensate for failure. Service records and system failure reports can be used to evaluate the likelihood that these incidents may occur. Types of industry in the community should also be considered in this assessment for a technological disaster with broad community impact.

Possibilities of disasters due to human events are many and varied. They may be accidental or planned incidents designed to wreak havoc. While there may be endless variations of human-initiated disasters, consolidating them into related categories will serve to streamline the planning. Local accident and crime statistics can prove helpful in establishing probability of occurrence. Still, human events disasters must be carefully considered and not dismissed because "it's never happened here." Common sense dictates that all hospitals have a plan for infant abduction, although few will actually experience the event.

Establishing the probability of occurrence of these various events is only part objective and statistical—the remainder can best be considered intuitive or highly subjective. Each hazard should be evaluated in some terms that will reflect its likelihood. The tool presented in this document, for example, uses the qualitative terms of high, medium, low, or no probability of occurrence. A factor may be used, but is not required, to quantitatively assess the probability.

#### Risk

Risk is the potential impact that any given hazard may have on the organization. Risk must be analyzed to include a variety of factors, which may include, but are not limited to the following:

- Threat to human life
- Threat to health and safety
- Property damage
- Systems failure
- Economic loss
- Loss of community trust/goodwill
- Legal ramifications

The threat to human life and the lesser threat to health and safety are considered to be so significant that they are given separate consideration on the hazard vulnerability analysis document.

Consider each possible disaster scenario to determine if either of these human impact threats is a factor.

The remaining three categories on the analysis tool classify risk factors as to their disruption to the organization in high, moderate, or low classification. From the bulleted list above, property damage, systems failure, economic loss, loss of community trust, and legal ramifications are all considered together to determine the level of risk.

Property damage in a disaster situation may be a factor more often than not, and the question is to what degree. Seismic activity may virtually destroy a building, or render it uninhabitable. In the most severe scenario of this type, the property damage will also include equipment and supplies within the facility. Other hazards may impact only a portion of the building, for example, flooding only

in the basement. Perhaps severe weather resulted only in a few broken windows.

Systems failure may have been the cause of the emergency in the first place. A major utility failure may require backup equipment or service that is significantly less convenient, or may not be sustainable for a lengthy time. Even though an alternate system is available, the failure will typically cause a hospital to implement emergency plans. Systems failure, however, is not necessarily an isolated occurrence. It can be a result of another hazard, such as flooding damage to an emergency generator.

In any disaster, economic loss is a possibility that deserves consideration. If a hospital cannot provide services because it succumbed to a hazard, revenue will be affected. It may result from damage to physical plant or equipment, inability to access the facility due to transportation or crowd control issues, or a negative public relations impact. Hospitals are businesses like any other, and economic disruptions can be managed for only a limited time. Each hazard must be analyzed for its adverse financial impact.

Negative public relations impact, otherwise known as loss of community trust or goodwill, is a factor that merits special attention, and is not necessarily an intuitive consideration. The community depends on the hospital to be there and provide services as they are needed, both routinely and in emergency situations. To consider this factor in your vulnerability analysis, ask whether or not the hospital's reputation in the community would suffer if it was ill-prepared to manage a scenario that actually occurred.

A related issue to loss of goodwill is the potential for legal ramifications in the aftermath of a disaster. If errors were made in the management of the emergency, if lives were lost or injuries occurred, the hospital could face legal action. It is advisable to consult risk management and/or the hospital's legal counsel if questions exist in this area.

## **Preparedness**

A final issue to evaluate in this analysis is the organization's current level of preparedness to manage any given disaster. This process should also involve the input of community agencies. The healthcare facility will not be responding to an emergency in a vacuum, and there may be community resources to support the hospital in its response.

Hospitals have done disaster planning for many years and are well prepared to manage many types of emergencies. The scope of current emergency planning has expanded though, and the typical organization will find at least some hazards from the all-hazards list for which improvements are needed. The current status of emergency plans and the training status of staff members to respond to any given hazard is a factor to consider in evaluating preparedness.

The healthcare organization may carry insurance to compensate for losses suffered as a result of some emergencies. Backup systems may also be thought of as insurance protecting against certain occurrences. The availability of insurance coverage or backup systems should be factored into the determination of the current preparedness status.

The hazard vulnerability analysis tool in this document evaluates the organization's preparedness level as good, fair, or poor. An alternative way of approaching this issue is to evaluate each hazard based on the amount of improvement needed, for example, slight, moderate, or major. Both systems will yield similar results.

Planners within the organization should evaluate this section critically and realistically. Failure to do so may result in a false sense of security, which may result in an increased impact on some of the risk factors discussed above. Appropriate evaluation of preparedness will direct the organization's effort and resources earmarked for emergency management.

# Hazard Vulnerability Analysis Tool

The hazard vulnerability analysis tool at the end of this document is simply that—a tool. Its use is not required by the Joint Commission. It is provided as a resource and a starting point for organizations to evaluate their vulnerability to specific hazards. It may be modified or changed in any way that is appropriate for individual facility use.

This particular document uses a quantitative method to evaluate vulnerability, which is also not required. The hospital may find a qualitative method equally as effective.

Using this tool, each potential hazard is evaluated as described above and scored as appropriate in the areas of probability, risk, and preparedness. The factors are then multiplied to give an overall total score for each hazard. Note that a hazard

with no probability of occurrence for a given organization is scored as zero, and therefore will automatically result in a zero for the total score.

Listing the hazards in descending order of the total scores will prioritize the hazards in need of the facility's attention and resources for emergency planning. It is recommended that each organization evaluate this final prioritization and determine a score below which no action is necessary. The focus will then be on the hazards of higher priority. Establishing a cutoff value, however, does introduce risk to the organization for those hazards falling below. The facility has determined that there is some probability and risk of the event occurring, and has chosen to exclude it from the planning process. It must be noted that the acceptance of all risk is at the discretion of the organization.

### References

Hazards Analysis. www.pascocounty.com/odp/hazard.htm

Hospital Accreditation Standards. Joint Commission on Accreditation of Healthcare Organizations, Oakbrook Terrace, IL, 2001.

Landesman, L.Y. Emergency Preparedness in Health Care Organizations. Joint Commission on Accreditation of Healthcare Organizations, Oakbrook Terrace, IL, 1996.

Definitions and Concepts for Natural Hazard and Disaster Planning. National Drought Mitigation Center. www.enso.unl.edu/ndmc/mitigate/hazdef.htm

#### HAZARD VULNERABILITY ANALYSIS

#### Instructions

Evaluate every potential event in each of the three categories of probability, risk, and preparedness. Add additional events as necessary.

Issues to consider for probability include, but are not limited to:

- 1. Known risk
- 2. Historical data
- 3. Manufacturer/vendor statistics

Issues to consider for risk include, but are not limited to:

- 1. Threat to life and/or health
- 2. Disruption of services
- 3. Damage/failure possibilities
- 4. Loss of community trust
- 5. Financial impact
- 6. Legal issues

Issues to consider for preparedness include, but are not limited to:

- 1. Status of current plans
- 2. Training status
- 3. Insurance
- 4. Availability of backup systems
- 5. Community resources

Multiply the ratings for each event in the area of probability, risk and preparedness. The total values, in descending order, will represent the events most in need of organization focus and resources for emergency planning. Determine a value below which no action is necessary. Acceptance of risk is at the discretion of the organization.

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